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NOTIFICATION OF REASONS FOR REFUSAL

Number of Patent Application	Patent Application 2002-263826
Preparation Date	March 15, 2007
Examiner of Patent Office	Shoichi SHIMIZU 8942 5P00
Agent for Patent Applicant	Messrs. Shigeaki YOSHIDA (and 2 others)
Applied Articles of the Law	Article 29 Paragraph 2

This application should be refused by the following reason. If you have an opinion about this, please submit a written argument within 60 days from the mailing date of this notification.

REASON

An invention, which relates to the following claim in this application, cannot be patented under the provision of Article 29, Paragraph 2 of the Patent Law, since it could easily have been made, prior to the filing thereof, by a person having ordinary skill in the art to which the invention pertains, on

the basis of inventions which were described in the following publications distributed or made available to public through an electric communication line in Japan or foreign countries prior to the filing thereof.

REMARK (see, LIST OF CITED REFERENCES ETC., as to cited references etc.)

As to Claim 1

Cited references 1, 2

The following cited reference 1 describes a camera device that simultaneously picks up images in plural visual field directions, through the use of a single image pickup element. In addition, the following cited reference 2 describes that a visual field of a single image pickup element is divided into regions to obtain narrow angle images and wide angle images (FIG.5A), and that an optical element having a concave lens function is used in an optical system for obtaining the wide angle images (FIG.6B).

A person having ordinary skill in the art could easily have made an invention described in Claim 1 of the present application, by applying the technique described in the cited reference 2 that belongs to the same technical field, to the camera device described in the cited reference 1.

<CLAIMS IN WHICH REASON FOR REFUSAL IS NOT FOUND>

As to inventions relating to Claims (2 - 12), a reason for refusal is not found at the current moment. In case that a reason for refusal is newly found, the reason for refusal will be notified.

LIST OF CITED REFERENCES ETC.

1. JP-A-2002-067793 publication
2. International publication 01/24515 (JP-T-2003-510666 publication)

RECORD OF PRIOR ART DOCUMENT SEARCH RESULTS

- | | |
|-----------------------|--|
| • Searched Fields | IPC H04N 5/225, 7/18
B60R 1/00 |
| • Prior Art Documents | JP-A-2000-089301 publication
JP-A-2002-077896 publication
JP-A-08-111799 publication
JP-A-04-228336 publication
JP-A-11-338074 publication
JP-A-2001-114048 publication
Registered utility model No. 3063778 |

publication

This record of prior art document search results is not
a thing which constitutes the reasons for refusal.

If you have an inquiry regarding content of this
notification of reasons for refusal, or a wish for an interview,
please make contact with the following person.

Patent Examination Fourth Department,

Video Equipment (Television), Shoichi SHIMIZU

TEL. 03(3581)1101 Extension 3579

FAX. 03(3501)0715

Reference Number: 414001016

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NOTIFICATION OF REASONS FOR REFUSAL

Number of Patent Application	Patent Application 2002-263826
Preparation Date	June 26, 2007
Examiner of Patent Office	Shoichi SHIMIZU 8942 5P00
Agent for Patent Applicant	Messrs. Shigeaki YOSHIDA (and 2 others)
Applied Articles of the Law	Article 29 Paragraph 2

This application should be refused by the following reason. If you have an opinion about this, please submit a written argument within 60 days from the mailing date of this notification.

REASON

Inventions, which relate to the following claims in this application, cannot be patented under the provision of Article 29, Paragraph 2 of the Patent Law, since they could easily have been made, prior to the filing thereof, by a person having ordinary skill in the art to which the inventions pertain, on

the basis of inventions which were described in the following publications distributed or made available to public through an electric communication line in Japan or foreign countries prior to the filing thereof.

REMARK (see, LIST OF CITED REFERENCES ETC., as to cited references etc.)

(1) As to Claims 1, 5, 8 - 10

Cited references 1 - 3

The following cited reference 1 describes a camera device that simultaneously picks up images in plural visual field directions, through the use of a single image pickup element, and a technique of guiding lights from the visual field directions of both left side and right side directions, onto an image pickup section by use of a single prism having a triangle pole shape.

The following cited reference 2 describes that, in a camera device, a visual field of a single image pickup element is divided into regions to obtain narrow angle images and wide angle images (FIG.5A), and that an optical element having a concave lens function is used in an optical system for obtaining the wide angle images (FIG.6B).

The following cited reference 3 describes that, in a

camera device, a case having a transparent window portion and a light shielding portion is integrally formed by a transparent material, and the light shielding portion is coated with a light shielding coating material, and a light projection portion is formed as a lens (see, paragraphs [0046] - [0048], Fig.14).

In addition, it is simply a commonly used technique in the technical field that a case is configured by a main body and a cover body and a waterproof structure is arranged in a joining portion, and that hard coat processing is applied to an optical member.

Then, a person having ordinary skill in the art could easily have made inventions described in Claims 1, 5, and 8 - 10 of the present application, by applying the technique described in the cited references 2, 3 and the above-mentioned commonly used technique, to the camera device described in the cited reference 1.

(2) As to Claim 4

Cited references 1 - 4

A technique of guiding lights from visual field directions of both left side and right side directions, onto an image pickup section by use of a pair of triangle pole shaped left and right prisms is described in the following cited reference 4, and known to public.

(3) As to Claims 6, 7

Cited references 1 - 5

A technique of integrally forming a plurality of lenses having different focal distances is a well known technique, as described in FIG.1A of the following cited reference 2, and Fig.2 (a) of the following cited reference 5. In addition, it is a normal technique that an optical system comprising a plurality of lenses is configured by integrally forming the plurality of lenses.

(4) As to Claims 11 - 13

Cited references 1 - 7

The following cited references 1, 7 describe that, in a vehicle periphery-viewing device, a camera device is disposed on a front portion of a vehicle to simultaneously pick up blind sides in three directions of both left and right side directions and a front direction, and the following cited references 6, 7 describe that a camera device is disposed on a rear portion of a vehicle to simultaneously pick up blind sides in three directions of both right and left side directions and a rear direction.

In addition, applying image processing to a picked-up

images in each direction to carry out rearrangement and synthesis of a mask image is described in the following cited reference 6, and known to public, and synthesizing a car navigation image is also described in the following cited reference 7, and known to public.

<CLAIMS IN WHICH REASON FOR REFUSAL IS NOT FOUND>

As to inventions relating to Claims (2, 3), a reason for refusal is not found at the current moment. In case that a reason for refusal is newly found, the reason for refusal will be notified.

LIST OF CITED REFERENCES ETC.

1. JP-A-2002-067793 publication
2. International publication 01/24515
3. JP-A-2001-309213 publication
4. Registered utility model No.3063778 publication
5. Microfilm of utility model application 55-146812
(JP-UM-A-57-069360)
6. JP-A-11-338074 publication
7. JP-A-2001-114048 publication

RECORD OF PRIOR ART DOCUMENT SEARCH RESULTS

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Patent Examination Fourth Department,

Video Equipment (Television), Shoichi SHIMIZU

TEL. 03(3581)1101 Extension 3579

FAX. 03(3501)0715

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : AUTO NETWORK GIJUTSU
KENKYUSHO:KK
SUMITOMO WIRING SYST LTD
SUMITOMO ELECTRIC IND LTD

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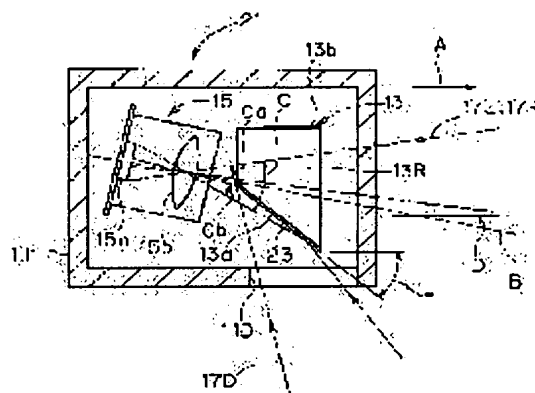
(72)Inventor : OKADA JUN

(54) ON-VEHICLE IMAGE PICKUP DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an on-vehicle image pickup device capable of simultaneously picking up images of left and right image pickup areas and a lower or upper side image pickup area largely dislocated in the lower or upper direction to the front direction of this on-vehicle image pickup device from the left and right image pickup areas without expanding an image pickup visibility angle in the vertical direction of an image pickup optical system.

SOLUTION: In this on-vehicle image pickup device 21, the light 17L and 17R from the left and right image pickup areas are reflected in the front direction A of this device 21 by prism side surfaces 13L and 13R of a prism 13, and are introduced to an image pickup element 15a via an image forming lens 15b, and while, the light 17D from the lower side image pickup area is reflected by a reflecting plate 23, and is introduced to the image pickup element 15a via the image forming lens 15b. The reflecting plate 23 is integrally arranged on an under surface 13a of the prism 13.



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3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] It is faced and installed in the car exterior and receives in the direction of a transverse plane of this mounted image pick-up equipment. The 1st of right and left, and the 2nd image pick-up field, It is mounted image pick-up equipment which picturizes the bottom or the 3rd upper image pick-up field to coincidence to said direction of a transverse plane. An image formation lens, By reflecting each light which carries out incidence to the image sensor which picturizes the image by which image formation was carried out with said image formation lens from said 1st and 2nd [said] image pick-up fields in the 1st and 2nd reflectors, transform the optical path and it introduces into said image formation lens. Mounted image pick-up equipment characterized by having the 2nd optical-path conversion means which is made to change the optical path, introduces into said image formation lens, and carries out incidence to said image sensor by making the light which carries out incidence to the 1st optical-path conversion means which carries out incidence to said image sensor from said 3rd image pick-up field reflected or refracted.

[Claim 2] Said 1st optical-path conversion means is formed in the plane-of-incidence side of said image formation lens. Two side faces of right and left of the three side faces which have a triangular cross-section configuration and constitute said triangle are the prism which functions as said the 1st and said 2nd reflector. Said 2nd optical-path conversion means is mounted image pick-up equipment according to claim 1 characterized by being the reflecting plate formed in the inferior surface of tongue or top face of said prism in one.

[Claim 3] Said 1st optical-path conversion means is formed in the plane-of-incidence side of said image formation lens. Two side faces of right and left of the three side faces which have a triangular cross-section configuration and constitute said triangle are the prism which functions as said the 1st and said 2nd reflector. Said 2nd optical-path conversion means is mounted image pick-up equipment according to claim 1 characterized by being the reflective film prepared in the inferior surface of tongue or top face of said prism in one.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is faced and installed in the car exterior, and relates to the 1st of right and left and the 2nd image pick-up field, and the mounted image pick-up equipment that picturizes the bottom or the 3rd upper image pick-up field to coincidence to said direction of a transverse plane to the direction of a transverse plane of this mounted image pick-up equipment.

[0002]

[Description of the Prior Art] This kind of mounted image pick-up equipment is installed in a car, the technique which picturizes the dead angle field of three directions hard to see from the operator of the car circumference is considered conventionally, and drawing 5 and drawing 6 are drawings showing an example of the suitable use gestalt of such mounted image pick-up equipment. the image pick-up fields 3L and 3R of the right and left [in this example, mounted image pick-up equipment 1 is installed in the car front end section 2, and] by the side of the front of a car with that mounted image pick-up equipment 1, and a front -- image pick-up field 3D by the side of the slanting lower part of the car front end section which becomes the shadow of a nose and cannot be easily visible from an operator is picturized.

[0003] Drawing 7 is the cross-sectional view showing the configuration of the equipment connected to such conventional mounted image pick-up equipment and it, and drawing 8 is drawing of longitudinal section showing the configuration of the mounted image pick-up equipment of drawing 7 . As shown in the case 11 of the protection-from-light nature of this mounted image pick-up equipment 1 at drawing 7 and drawing 8 , transparency aperture 11D is prepared in right-and-left both sides to the direction A of a transverse plane in that front section at the transparency apertures 11L and 11R of a pair, and the slant bottom. The transparency apertures 11L and 11R on either side are for introducing each light 17L and 17R from an image pick-up field on either side, and lower transparency aperture 11D is for introducing optical 17D from a lower image pick-up field.

[0004] In this case 11, the prism (1st optical-path conversion means) 13 with which plane view has a triangular cross-section configuration The vertical-angle side While receipt arrangement is carried out with the posture which turned to the on either side transparency aperture 11L and 11R side two prism side faces (the 1st and 2nd reflectors) 13L and 13R of right and left of the three side faces which constitute said triangle towards the anterior part (drawing 7 upper part of a case 11) of a case 11, respectively Hold arrangement of the image pick-up unit 15 is carried out so that it may be located in the tooth-back side of the prism 13.

[0005] The image pick-up unit 15 is equipped with image sensor (CCD etc.) 15a and image formation lens 15b. Image sensor 15a picturizes the image in which image formation was carried out by image formation lens 15b.

[0006] Moreover, prism 13 is installed with the posture which stood straight at the right angle to the direction A of a transverse plane at the upper part side of the optical path so that the optical path of optical 17D which carries out incidence towards image formation lens 15b from lower transparency aperture 11D may be avoided. And the field-of-view angle calcium for picturizing an image pick-up field on either side is set up in the field of the upper half of all the field-of-view angles C over the vertical direction of the image pick-up optical system which consists of image sensor 15a and image formation lens 15b, and the field-of-view angle Cb for picturizing a lower image pick-up field in the

field of the lower half of all the field-of-view angles C is set up.

[0007] And incidence of each light 17L and 17R which carried out incidence through the transparency apertures 13L and 13R from the image pick-up field on either side is carried out into prism 13 through the prism side faces 13L and 13R on either side, and total reflection is carried out to the image formation lens 15b side on the prism side faces 13L and 13R of the opposite side, they carries out outgoing radiation out of prism 13, and carries out incidence to image sensor 15a through image formation lens 15b. On the other hand, optical 17D which carried out incidence through transparency aperture 11D from the lower image pick-up field is directly introduced into image formation lens 15b, without minding prism 13, and carries out incidence to image sensor 15a through image formation lens 15b. The image of the image pick-up field of right and left and the three directions of [lower] is picturized by single image sensor 15a by this.

[0008] It is inputted into the predetermined processing section 5, predetermined processing of a reversal process etc. is performed, the picture signal outputted from image sensor 15a is given to the display 7 in the car, and the image of each image pick-up field picturized by image sensor 15a is displayed with a display 7. Here, the viewing area on the screen of a display 7 is divided into three subregions 7L, 7R, and 7D, the image of a left-hand side image pick-up field is displayed on upper left subregion 7L, the image of a right-hand side image pick-up field is displayed on upper right subregion 7R, and the image of a lower image pick-up field is displayed on lower subregion 7D.

[0009] When setting such mounted image pick-up equipment 1 as the car front end section 2 as shown in drawing 5 and drawing 6 , and performing the image pick-up of the image pick-up fields 3L and 3R and 3D in a place, the direction A of a transverse plane of mounted image pick-up equipment 1 is horizontally parallel, and it is installed so that the direction of a transverse plane of a car may be turned to. And when a car puts in the bad crossroads of a prospect etc., the image pick-up fields 3L and 3R on either side have the request that it is desirable to set up so that the medial axis may become almost horizontally parallel so that the longitudinal direction of crossroads can be picturized exactly. Moreover, lower image pick-up field 3D has the request that it is desirable to set up so that the medial axis may receive horizontally and may be suitable caudad at a big include angle so that the field of the car front end section 2 immediately bottom used as an operator's dead angle can be picturized exactly.

[0010] To such a request, the image pick-up optical axis B of the image pick-up unit 15 is set up so that the medial axis of the field-of-view angle calcium for picturizing the image pick-up fields 3L and 3R on either side may become almost horizontally parallel, it may receive horizontally and an include angle D may be made caudad.

[0011] In addition, all the field-of-view angles C of the image pick-up optical system of mounted image pick-up equipment 1 will be restricted in a fixed limit (for example, 40 degrees), if it is going to control distortion of an image pick-up image etc.

[0012]

[Problem(s) to be Solved by the Invention] however, with above-mentioned conventional mounted image pick-up equipment 1 Since optical 17D from the image pick-up field (3D) of the bottom which carries out incidence through transparency aperture 11D is directly introduced into image formation lens 15b, By the limit to all the field-of-view angles C of image pick-up optical system, a lower image pick-up field (3D) will be set up to the vertical direction near the bottom of an image pick-up field (3L, 3R) on either side. When it installs in the car front end section 2 as mentioned above, there is a problem that it is difficult to picturize effectively image pick-up field 3D of the car front end section 2 immediately bottom.

[0013] Then, this invention aims at offering the mounted image pick-up equipment which can picturize to coincidence an image pick-up field on either side, and the bottom from which it separated from the image pick-up field of those right and left greatly in the bottom or above to the direction of a transverse plane of this mounted image pick-up equipment or an upper image pick-up field with a single image sensor, without making the field-of-view angle over the vertical direction of image pick-up optical system expand in view of said trouble.

[0014]

[Means for Solving the Problem] The technical means for attaining said purpose are faced and installed in the car exterior, and it receives in the direction of a transverse plane of this mounted

image pick-up equipment. The 1st of right and left, and the 2nd image pick-up field, It is mounted image pick-up equipment which picturizes the bottom or the 3rd upper image pick-up field to coincidence to said direction of a transverse plane. An image formation lens, By reflecting each light which carries out incidence to the image sensor which picturizes the image by which image formation was carried out with said image formation lens from said 1st and 2nd [said] image pick-up fields in the 1st and 2nd reflectors, transform the optical path and it introduces into said image formation lens. By making the light which carries out incidence to the 1st optical-path conversion means which carries out incidence to said image sensor from said 3rd image pick-up field reflected or refracted, the optical path is transformed, and it introduces into said image formation lens, and is characterized by having the 2nd optical-path conversion means which carries out incidence to said image sensor.

[0015] Preferably, two side faces of right and left of the three side faces which said 1st optical-path conversion means is formed in the plane-of-incidence side of said image formation lens, have a triangular cross-section configuration, and constitute said triangle are the prism which functions as said the 1st and said 2nd reflector, and, as for said 2nd optical-path conversion means, it is good that it is the reflecting plate formed in the inferior surface of tongue or the top face of said prism in one.

[0016] Moreover, preferably, two side faces of right and left of the three side faces which said 1st optical-path conversion means is formed in the plane-of-incidence side of said image-formation lens, have a triangular cross-section configuration, and constitute said triangle are the prism which functions as said the 1st and said 2nd reflector, and, as for said 2nd optical-path conversion means, it is good that it is the reflective film prepared in the inferior surface of tongue or the top face of said prism in one.

[0017]

[Embodiment of the Invention] <1st operation gestalt> drawing 1 is drawing of longitudinal section showing the configuration of the mounted image pick-up equipment concerning the 1st operation gestalt of this invention. The point that the mounted image pick-up equipment 21 concerning this operation gestalt differs from the mounted image pick-up equipment 1 shown in above-mentioned drawing 7 and above-mentioned drawing 8 substantially is only a point relevant to the reflecting plate (2nd optical-path conversion means) 23 and it which are mentioned later, gives the same reference mark to a corresponding part, and omits the overlapping explanation.

[0018] With this mounted image pick-up equipment 21, a reflecting plate 23 is formed in inferior-surface-of-tongue 13a or top-face 13b (here inferior-surface-of-tongue 13a) of prism 13 in one corresponding to the field-of-view angle Cb. By being reflected with a reflecting plate 23, optical 17D which carries out incidence from the image pick-up field of the bottom or a top (here under) to the direction A of a transverse plane transforms the optical path, and is introduced into image formation lens 15b, and incidence is carried out to image sensor 15a. Here, the reflecting plate 23 has fixed with adhesives etc. to inferior-surface-of-tongue 13a of prism 13.

[0019] E is set as a value required to lead optical 17D from the image pick-up field of the bottom considered as a request to image formation lens 15b and image sensor 15a whenever [over the direction A of a transverse plane of the reflecting plate 23 which fixes to inferior-surface-of-tongue 13a and its inferior-surface-of-tongue 13a of prism 13 / angle-of-inclination].

[0020] And while the light 17L and 17R from an image pick-up field on either side is reflected by the prism side faces 13L and 13R of prism 13 and it is introduced into image sensor 15a through image formation lens 15b, it is reflected by the reflecting plate 23 and optical 17D from a lower image pick-up field is introduced into image sensor 15a through image formation lens 15b.

[0021] An image pick-up field on either side and the image pick-up field of the bottom from which it separated from the image pick-up field of the right and left greatly downward to the direction A of a transverse plane can be picturized to coincidence by single image sensor 15a, without making the field-of-view angle C over the vertical direction of the image pick-up optical system which consists of image sensor 15a and image formation lens 15b expand by this. For example, the mounted image pick-up equipment 21 concerning this operation gestalt is installed in the car front end section 2 like the case of the above-mentioned mounted image pick-up equipment 1. When the image pick-up fields 3L and 3R (refer to drawing 5) of the right and left in the car front and lower image pick-up field 3D (refer to drawing 6) are picturized, with this mounted image pick-up equipment 21 while

picturizing exactly the image pick-up fields 3L and 3R on either side -- the car front end section 2 with an image pick-up difficult with conventional mounted image pick-up equipment 1 -- image pick-up field 3D by the side of a lower part can be picturized immediately easily.

[0022] Moreover, since the reflecting plate 23 is formed in inferior-surface-of-tongue 13a of prism 13 in one, prism 23 and a reflecting plate 23 can be dealt with as one component, and reduction of components mark, the number of erectors, etc. can be aimed at.

[0023] Furthermore, the optical path of each light 17L and 17R from the image pick-up field of the right and left which it is reflected in the plane-of-incidence side of image formation lens 15b by prism 13, and carry out incidence to image formation lens 15b, A reflecting plate 23 can divide effectively the optical path of optical 17D from the image pick-up field of the bottom which it is reflected by the reflecting plate 23 and carries out incidence to image formation lens 15b. By this Mixture **** of the light 17L and 17R from the image pick-up field of the right and left on the light-receiving side of image sensor 15a and optical 17D from a lower image pick-up field can be controlled effectively, and improvement in image quality can be aimed at.

[0024] In addition, although the reflecting plate 23 constituted the 2nd optical-path conversion means, the reflective film prepared in inferior-surface-of-tongue 13a or top-face 13b of prism 13 in one may constitute the 2nd optical-path conversion means from this operation gestalt. In this case, the reflective film is formed of the metal membrane prepared in inferior-surface-of-tongue 13a or top-face 13b of prism 13.

[0025] <2nd operation gestalt> drawing 2 is drawing of longitudinal section showing the configuration of the important section of the mounted image pick-up equipment concerning the 2nd operation gestalt of this invention. Prism 13 attaches the reference mark same into the part which is only the point currently separately installed in a case 11, and corresponds, and, as for a substantially different point from the mounted image pick-up equipment 21 which requires the mounted image pick-up equipment 21 concerning this operation gestalt for the above-mentioned 1st operation gestalt, a reflecting plate 23 omits the explanation to overlap.

[0026] Also in this operation gestalt, without making the field-of-view angle C over the vertical direction of image pick-up optical system expand An image pick-up field on either side, While being able to picturize to coincidence the image pick-up field of the bottom from which it separated from the image pick-up field of the right and left greatly downward to the direction A of a transverse plane by single image sensor 15a Mixture **** of the light 17L and 17R from the image pick-up field of the right and left on the light-receiving side of image sensor 15a and optical 17D from a lower image pick-up field can be effectively controlled with a reflecting plate 23.

[0027] <3rd operation gestalt> drawing 3 is drawing of longitudinal section showing the configuration of the important section of the mounted image pick-up equipment concerning the 3rd operation gestalt of this invention. A substantially different point from the mounted image pick-up equipment 21 which requires the mounted image pick-up equipment 21 concerning this operation gestalt for the above-mentioned 1st operation gestalt is only a point of having used prism 25 instead of the reflecting plate 23 as 2nd optical-path conversion means, gives the same reference mark to a corresponding part, and omits the overlapping explanation.

[0028] With this operation gestalt, corresponding to the field-of-view angle Cb, prism 25 is formed in the lower part side of prism 13, by being refracted with prism 25, optical 17D which carries out incidence from a lower image pick-up field to the direction A of a transverse plane transforms the optical path, and is introduced into image formation lens 15b, and incidence is carried out to image sensor 15a.

[0029] Here, prism 25 has the triangular longitudinal-section configuration, according to two prism side faces 25a and 25b in which Yamagata is crossed towards the abbreviation upper part, makes optical 17D which carries out incidence from a lower image pick-up field refracted, and transforms the optical path to the image formation lens 15b side. Moreover, the include angle which whenever [to the direction A of a transverse plane of prism 25 / tilt-angle], and both the prism side faces 25a and 25b make is set as a value required to lead optical 17D from the image pick-up field of the bottom considered as a request to image formation lens 15b and image sensor 15a, respectively.

[0030] As mentioned above, also in this operation gestalt, an image pick-up field on either side and the image pick-up field of the bottom from which it separated from the image pick-up field of the

right and left greatly downward to the direction A of a transverse plane can be picturized to coincidence by single image sensor 15a, without making the field-of-view angle C over the vertical direction of image pick-up optical system expand.

[0031] <4th operation gestalt> drawing 4 is drawing of longitudinal section showing the configuration of the important section of the mounted image pick-up equipment concerning the 4th operation gestalt of this invention. A substantially different point from the mounted image pick-up equipment 21 which requires the mounted image pick-up equipment 21 concerning this operation gestalt for the above-mentioned 1st operation gestalt The point of having used prism 27 instead of the reflecting plate 23 as 2nd optical-path conversion means, It is only the point which picturizes a lower image pick-up field according to the upper field-of-view angle calcium, and picturizes an image pick-up field on either side according to the downward field-of-view angle Cb, and the same reference mark is given to a corresponding part, and the overlapping explanation is omitted.

[0032] In addition, with this operation gestalt, in order to picturize an image pick-up field on either side according to the downward field-of-view angle Cb, the image pick-up optical axis B of the image pick-up unit 15 is set up so that the medial axis of the field-of-view angle Cb may become almost horizontally parallel, it may receive horizontally and an include angle Da may be made to the upper part.

[0033] With this operation gestalt, corresponding to the field-of-view angle calcium, prism 27 is formed in the upper part side of prism 13, by being refracted with prism 27, optical 17D which carries out incidence from a lower image pick-up field to the direction A of a transverse plane transforms the optical path, and is introduced into image formation lens 15b, and incidence is carried out to image sensor 15a.

[0034] Here, it has a triangular longitudinal-section configuration and prism 27 gets down from it, according to two prism side faces 27a and 27b in which Yamagata is crossed towards the abbreviation upper part, optical 17D which carries out incidence from a lower image pick-up field is made refracted, and the optical path is transformed to the image formation lens 15b side. Moreover, the include angle which whenever [to the direction A of a transverse plane of prism 27 / tilt-angle], and both the prism side faces 27a and 27b make is set as a value required to lead optical 17D from the image pick-up field of the bottom considered as a request to image formation lens 15b and image sensor 15a, respectively.

[0035] As mentioned above, also in this operation gestalt, an image pick-up field on either side and the image pick-up field of the bottom from which it separated from the image pick-up field of the right and left greatly downward to the direction A of a transverse plane can be picturized to coincidence by single image sensor 15a, without making the field-of-view angle C over the vertical direction of image pick-up optical system expand.

[0036]

[Effect of the Invention] According to invention according to claim 1, besides the 1st optical-path conversion means which is made to change the optical path of the light from the 1st and 2nd image pick-up fields, and is introduced into an image formation lens Since the 2nd optical-path conversion means which is made to change the optical path and is introduced into an image formation lens by making the light which carries out incidence from the 3rd image pick-up field reflected or refracted is established, Without making the field-of-view angle over the vertical direction of the image pick-up optical system which consists of an image sensor and an image formation lens expand The 1st and the 2nd image pick-up field, The 3rd image pick-up field from which it separated from those 1st and 2nd image pick-up fields greatly in the bottom or above to the direction of a transverse plane of this mounted image pick-up equipment can be picturized to coincidence with a single image sensor.

[0037] Since the reflecting plate which is the 2nd optical-path conversion means is formed in the inferior surface of tongue or top face of prism which is the 1st optical-path conversion means in one according to invention according to claim 2, prism and the 2nd optical-path conversion means can be dealt with as one component, and reduction of components mark, the number of erectors, etc. can be aimed at.

[0038] Moreover, the optical path of each light from the 1st [which it is reflected in the plane-of-incidence side of an image formation lens by prism, and carries out incidence to an image formation lens], and 2nd image pick-up fields, A reflecting plate can divide effectively the optical path of the

light from the 3rd image pick-up field which it is reflected by the reflecting plate and carries out incidence to an image formation lens. By this Mixture **** with the light from the image pick-up field of the light from the image pick-up field of the right and left on the light-receiving side of an image sensor, the bottom, or a top can be controlled effectively, and improvement in image quality can be aimed at.

[0039] Since the reflective film which is the 2nd optical-path conversion means is prepared in the inferior surface of tongue or top face of prism which is the 1st optical-path conversion means in one according to invention according to claim 3, prism and the 2nd optical-path conversion means can be dealt with as one component, and reduction of components mark, the number of erectors, etc. can be aimed at.

[0040] Moreover, since the reflective film which is the 2nd optical-path conversion means is prepared in the inferior surface of tongue or top face of prism which is the 1st optical-path conversion means in one, The optical path of each light from the 1st [which it is reflected in the plane-of-incidence side of an image formation lens by prism and carries out incidence to an image formation lens], and 2nd image pick-up fields, The reflective film can divide effectively the optical path of the light from the 3rd image pick-up field which it is reflected by the reflective film and carries out incidence to an image formation lens. By this Mixture **** with the light from the image pick-up field of the light from the image pick-up field of the right and left on the light-receiving side of an image sensor, the bottom, or a top can be controlled effectively, and improvement in image quality can be aimed at.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing of longitudinal section showing the configuration of the mounted image pick-up equipment concerning the 1st operation gestalt of this invention.

[Drawing 2] It is drawing of longitudinal section showing the configuration of the important section of the mounted image pick-up equipment concerning the 2nd operation gestalt of this invention.

[Drawing 3] It is drawing of longitudinal section showing the configuration of the important section of the mounted image pick-up equipment concerning the 3rd operation gestalt of this invention.

[Drawing 4] It is drawing of longitudinal section showing the configuration of the important section of the mounted image pick-up equipment concerning the 4th operation gestalt of this invention.

[Drawing 5] It is drawing showing an example of the suitable use gestalt of the mounted image pick-up equipment of drawing 1 .

[Drawing 6] It is drawing showing an example of the suitable use gestalt of the mounted image pick-up equipment of drawing 1 .

[Drawing 7] It is the cross-sectional view showing the configuration of conventional mounted image pick-up equipment etc.

[Drawing 8] It is drawing of longitudinal section showing the configuration of the mounted image pick-up equipment of drawing 7 .

[Description of Notations]

7 Display

11 Case

13 Prism

13L, 13R Prism side face

15a Image sensor

15b Image formation lens

17L, 17R, 17D Light

21 Mounted Image Pick-up Equipment

23 Reflecting Plate

25 27 Prism

A The direction of a transverse plane

[Translation done.]

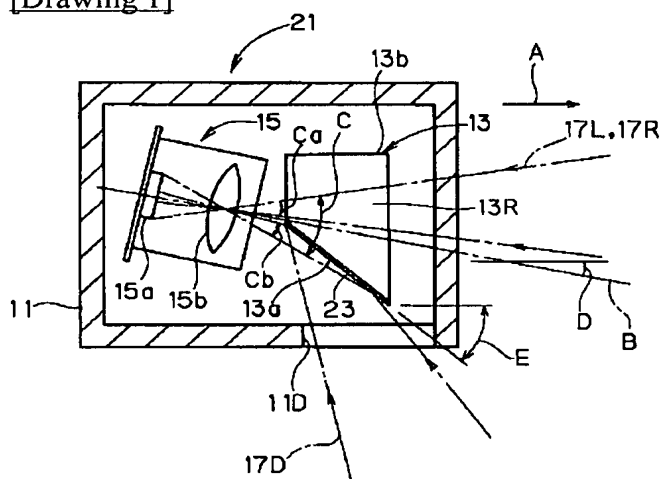
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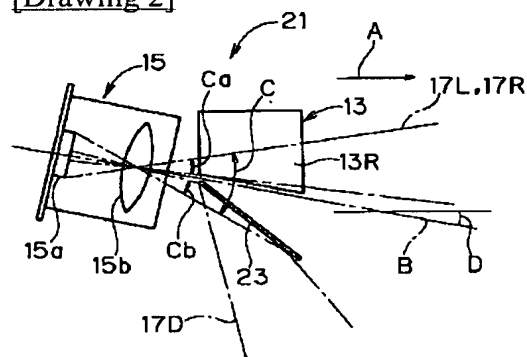
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DRAWINGS

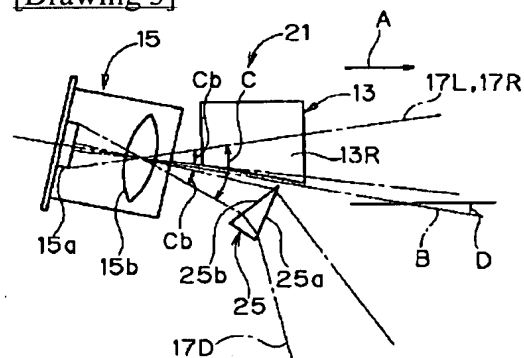
[Drawing 1]



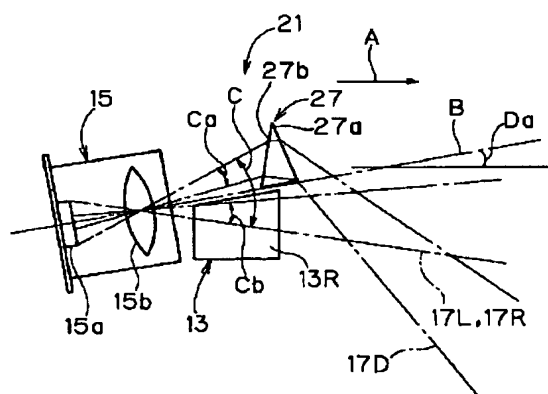
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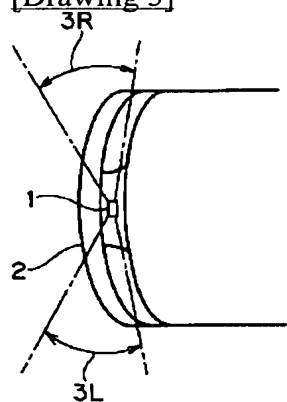
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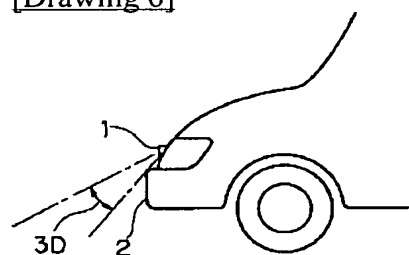
[Drawing 4]



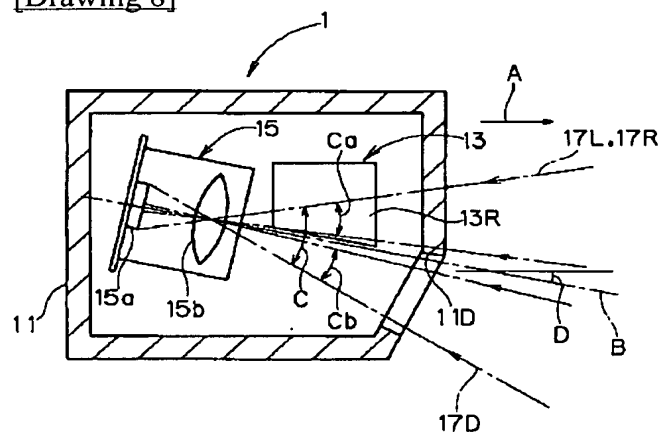
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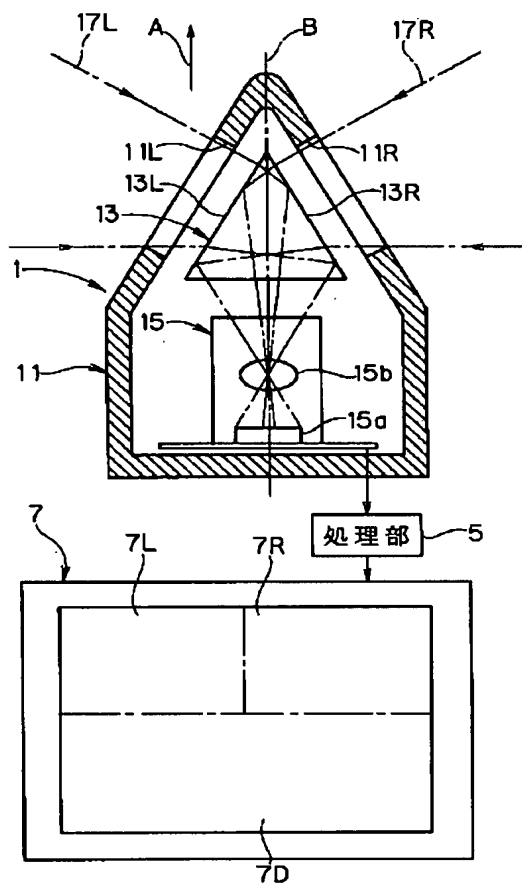
[Drawing 6]



[Drawing 8]



[Drawing 7]



[Translation done.]

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(71) 出願人 395011665

株式会社オートネットワーク技術研究所
愛知県名古屋市中区菊住1丁目7番10号

(71) 出願人 000183406

住友電装株式会社
三重県四日市市西末広町1番14号

(71) 出願人 000002130

住友電気工業株式会社
大阪府大阪市中央区北浜四丁目5番33号

(74) 代理人 100089233

弁理士 吉田 茂明 (外2名)

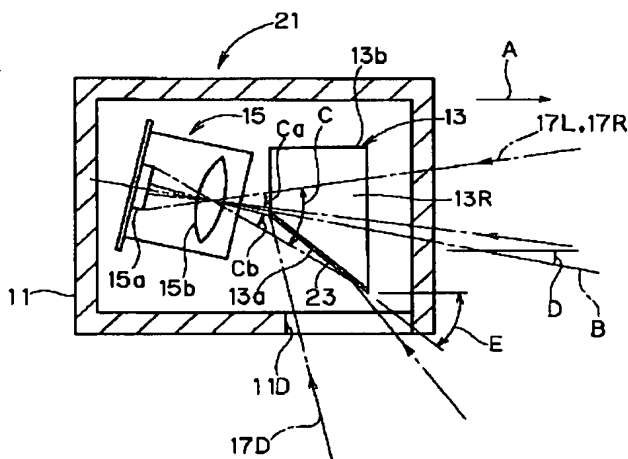
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(54) 【発明の名称】 車載撮像装置

(57) 【要約】

【課題】 撮像光学系の上下方向に対する撮像視野角を拡大させることなく、左右の撮像領域と、その左右の撮像領域からこの車載撮像装置の正面方向に対して下または上方向に大きく外れた下または上側の撮像領域とを単一の撮像素子により同時に撮像することができる車載撮像装置を提供する。

【解決手段】 この車載撮像装置21では、この装置21の正面方向Aに対して左右の撮像領域からの光17L、17Rはプリズム13のプリズム側面13L、13Rによって反射されて結像レンズ15bを介して撮像素子15aに導入される一方、下側の撮像領域からの光17Dは反射板23によって反射されて結像レンズ15bを介して撮像素子15aに導入されるようになっている。反射板23は、プリズム13の下面13aに一体的に設けられている。



【特許請求の範囲】

【請求項1】 車両外部に面して設置され、この車載撮像装置の正面方向に対して左右の第1および第2の撮像領域と、前記正面方向に対して下または上側の第3の撮像領域とを同時に撮像する車載撮像装置であって、結像レンズと、

前記結像レンズによって結像された像を撮像する撮像素子と、

前記第1および前記第2の撮像領域から入射する各光をその第1および第2の反射面で反射させることによりその光路を変換させて前記結像レンズに導入し、前記撮像素子に入射させる第1の光路変換手段と、

前記第3の撮像領域から入射する光を、反射または屈折させることによりその光路を変換させて前記結像レンズに導入し、前記撮像素子に入射させる第2の光路変換手段と、を備えることを特徴とする車載撮像装置。

【請求項2】 前記第1の光路変換手段は、前記結像レンズの入射面側に設けられ、三角形の断面形状を有し、前記三角形を構成する3つの側面のうちの左右の2つの側面が前記第1および前記第2の反射面として機能するプリズムであり、

前記第2の光路変換手段は、前記プリズムの下面または上面に一体的に設けられた反射板であることを特徴とする請求項1に記載の車載撮像装置。

【請求項3】 前記第1の光路変換手段は、前記結像レンズの入射面側に設けられ、三角形の断面形状を有し、前記三角形を構成する3つの側面のうちの左右の2つの側面が前記第1および前記第2の反射面として機能するプリズムであり、

前記第2の光路変換手段は、前記プリズムの下面または上面に一体的に設けられた反射膜であることを特徴とする請求項1に記載の車載撮像装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、車両外部に面して設置され、この車載撮像装置の正面方向に対して左右の第1および第2の撮像領域と、前記正面方向に対して下または上側の第3の撮像領域とを同時に撮像する車載撮像装置に関するものである。

【0002】

【従来の技術】 この種の車載撮像装置を車両に設置して、車両周辺の運転者から見にくい3方向の死角領域を撮像する技術が従来より考えられており、図5および図6は、このような車載撮像装置の好適な使用形態の一例を示す図である。この例では、車載撮像装置1が車両前端部2に設置され、その車載撮像装置1によって、車両の前方側における左右の撮像領域3L、3R、およびフロントノーズの影になって運転者から見にくい車両前端部の斜め下方側の撮像領域3Dが撮像されるようになっている。

【0003】 図7はこのような従来の車載撮像装置およびそれに接続される装置の構成を示す横断面図であり、図8は図7の車載撮像装置の構成を示す縦断面図である。この車載撮像装置1の遮光性のケース11には、図7および図8に示すように、その前面部における正面方向Aに対して左右両側に一對の透過窓11L、11R、斜め下側に透過窓11Dが設けられている。左右の透過窓11L、11Rは、左右の撮像領域からの各光17L、17Rを導入するためのものであり、下側の透過窓11Dは、下側の撮像領域からの光17Dを導入するためのものである。

【0004】 このケース11内には、平面視が三角形の断面形状を有するプリズム（第1の光路変換手段）13が、その頂角側をケース11の前部（図7ではケース11の上部）に向けかつ前記三角形を構成するその3つの側面のうちの左右の2つのプリズム側面（第1および第2の反射面）13L、13Rをそれぞれ左右の透過窓11L、11R側に向けた姿勢で収納配設されるとともに、そのプリズム13の背面側に位置するように撮像ユニット15が収容配設される。

【0005】 撮像ユニット15には、撮像素子（CCD等）15aと、結像レンズ15bとが備えられる。撮像素子15aは、結像レンズ15bによって結像された像を撮像する。

【0006】 また、プリズム13は、下側の透過窓11Dから結像レンズ15bに向けて入射する光17Dの光路を避けるように、その光路の上方側に正面方向Aに対して直角に直立した姿勢で設置されている。そして、撮像素子15aおよび結像レンズ15bからなる撮像光学系の上下方向に対する全撮像視野角Cのうちの上半分の領域内に、左右の撮像領域を撮像するための撮像視野角Caが設定され、全撮像視野角Cのうちの下半分の領域内に下側の撮像領域を撮像するための撮像視野角Cbが設定されている。

【0007】 そして、左右の撮像領域から透過窓13L、13Rを介して入射した各光17L、17Rは、左右のプリズム側面13L、13Rを介してプリズム13内に入射し、反対側のプリズム側面13L、13Rで結像レンズ15b側に全反射されてプリズム13外に出射し、結像レンズ15bを介して撮像素子15aに入射する。一方、下側の撮像領域から透過窓11Dを介して入射した光17Dは、プリズム13を介さずに結像レンズ15bに直接導入され、結像レンズ15bを介して撮像素子15aに入射する。これによって、左右および下側の3方向の撮像領域の画像が、単一の撮像素子15aによって撮像される。

【0008】 撮像素子15aから出力される画像信号は、所定の処理部5に入力され反転処理等の所定の処理が施されて車内の表示装置7に与えられ、撮像素子15aによって撮像された各撮像領域の画像が表示装置7に

よって表示される。ここでは、表示装置 7 の画面上の表示領域は、3つの部分領域 7 L、7 R、7 Dに分割されており、左上の部分領域 7 Lに左側の撮像領域の画像が表示され、右上の部分領域 7 Rに右側の撮像領域の画像が表示され、下側の部分領域 7 Dに下側の撮像領域の画像が表示される。

【0009】ところで、例えば、このような車載撮像装置 1 を図 5 および図 6 に示すように車両前端部 2 に設定して撮像領域 3 L、3 R、3 Dの撮像を行う場合、車載撮像装置 1 は、その正面方向 A が水平方向と平行で、かつ車両の正面方向を向くように設置される。そして、左右の撮像領域 3 L、3 Rは、車両が見通しの悪い四つ角等にさしかかった場合に四つ角の左右方向を的確に撮像できるように、例えばその中心軸が水平方向とほぼ平行になるように設定するのが好ましいという要請がある。また、下側の撮像領域 3 Dは、運転者の死角となる車両前端部 2 のすぐ下側の領域を的確に撮像できるように、例えばその中心軸が水平方向に対して大きな角度で下方に向くように設定するのが好ましいという要請がある。

【0010】このような要請に対し、撮像ユニット 15 の撮像光軸 B は、左右の撮像領域 3 L、3 Rを撮像するための撮像視野角 C a の中心軸が水平方向とほぼ平行となるように、水平方向に対して下方に角度 D をなすように設定される。

【0011】なお、車載撮像装置 1 の撮像光学系の全撮像視野角 C は、撮像画像の歪み等を抑制しようとする、一定の限度（例えば、 40° ）内に制限されるようになっている。

【0012】

【発明が解決しようとする課題】しかしながら、上述の従来の車載撮像装置 1 では、透過窓 11 D を介して入射する下側の撮像領域（3 D）からの光 17 D が結像レンズ 15 b に直接導入されるようになっているため、撮像光学系の全撮像視野角 C に対する制限により、下側の撮像領域（3 D）が上下方向に対して左右の撮像領域（3 L、3 R）の下側近傍に設定されてしまい、上述のように車両前端部 2 に設置した場合、車両前端部 2 のすぐ下側の撮像領域 3 D を有効に撮像することが困難であるという問題がある。

【0013】そこで、本発明は前記問題点を鑑み、撮像光学系の上下方向に対する撮像視野角を拡大させることなく、左右の撮像領域と、その左右の撮像領域からこの車載撮像装置の正面方向に対して下または上方向に大きく外れた下または上側の撮像領域とを単一の撮像素子により同時に撮像することができる車載撮像装置を提供することを目的とする。

【0014】

【課題を解決するための手段】前記目的を達成するための技術的手段は、車両外部に面して設置され、この車載撮像装置の正面方向に対して左右の第 1 および第 2 の撮

像領域と、前記正面方向に対して下または上側の第 3 の撮像領域とを同時に撮像する車載撮像装置であって、結像レンズと、前記結像レンズによって結像された像を撮像する撮像素子と、前記第 1 および前記第 2 の撮像領域から入射する各光をその第 1 および第 2 の反射面で反射させることによりその光路を変換させて前記結像レンズに導入し、前記撮像素子に入射させる第 1 の光路変換手段と、前記第 3 の撮像領域から入射する光を、反射または屈折させることによりその光路を変換させて前記結像レンズに導入し、前記撮像素子に入射させる第 2 の光路変換手段と、を備えることを特徴とする。

【0015】好ましくは、前記第 1 の光路変換手段は、前記結像レンズの入射面側に設けられ、三角形の断面形状を有し、前記三角形を構成する 3 つの側面のうちの左右の 2 つの側面が前記第 1 および前記第 2 の反射面として機能するプリズムであり、前記第 2 の光路変換手段は、前記プリズムの下面または上面に一体的に設けられた反射板であるのがよい。

【0016】また、好ましくは、前記第 1 の光路変換手段は、前記結像レンズの入射面側に設けられ、三角形の断面形状を有し、前記三角形を構成する 3 つの側面のうちの左右の 2 つの側面が前記第 1 および前記第 2 の反射面として機能するプリズムであり、前記第 2 の光路変換手段は、前記プリズムの下面または上面に一体的に設けられた反射膜であるのがよい。

【0017】

【発明の実施の形態】＜第 1 実施形態＞図 1 は本発明の第 1 実施形態に係る車載撮像装置の構成を示す縦断面図である。本実施形態に係る車載撮像装置 21 が前述の図 7 および図 8 に示す車載撮像装置 1 と実質的に異なる点は、後述する反射板（第 2 の光路変換手段）23 およびそれに関連する点のみであり、対応する部分には同一の参照符号を付し、重複する説明を省略する。

【0018】この車載撮像装置 21 では、撮像視野角 C b に対応してプリズム 13 の下面 13 a または上面 13 b（ここでは下面 13 a）に反射板 23 が一体的に設けられ、正面方向 A に対して下または上側（ここでは下側）の撮像領域から入射する光 17 D が、反射板 23 で反射されることによりその光路を変換させて結像レンズ 15 b に導入され、撮像素子 15 a に入射されるようになっている。ここでは、反射板 23 はプリズム 13 の下面 13 a に接着剤等により固着されている。

【0019】プリズム 13 の下面 13 a およびその下面 13 a に固着される反射板 23 の正面方向 A に対する傾き角度 E は、所望とする下側の撮像領域からの光 17 D を結像レンズ 15 b および撮像素子 15 a に導くのに必要な値に設定される。

【0020】そして、左右の撮像領域からの光 17 L、17 R はプリズム 13 のプリズム側面 13 L、13 R によって反射されて結像レンズ 15 b を介して撮像素子 1

5 aに導入される一方、下側の撮像領域からの光17Dは反射板23によって反射されて結像レンズ15bを介して撮像素子15aに導入されるようになっている。

【0021】これによって、撮像素子15aおよび結像レンズ15bからなる撮像光学系の上下方向に対する撮像視野角Cを拡大させることなく、左右の撮像領域と、その左右の撮像領域から正面方向Aに対して下方向に大きく外れた下側の撮像領域とを単一の撮像素子15aにより同時に撮像することができる。例えば、本実施形態に係る車載撮像装置21を前述の車載撮像装置1の場合と同様に車両前端部2に設置し、車両前方における左右の撮像領域3L、3R(図5参照)および下側の撮像領域3D(図6参照)を撮像した場合、この車載撮像装置21によって、左右の撮像領域3L、3Rを的確に撮像しつつ、従来の車載撮像装置1では撮像が困難な車両前端部2のすぐ下方側の撮像領域3Dを容易に撮像することができる。

【0022】また、反射板23がプリズム13の下面13aに一体的に設けられているため、プリズム23と反射板23とを1部品として取り扱うことができ、部品点数および組立工数等の削減が図れる。

【0023】さらに、結像レンズ15bの入射面側において、プリズム13によって反射されて結像レンズ15bに入射する左右の撮像領域からの各光17L、17Rの光路と、反射板23によって反射されて結像レンズ15bに入射する下側の撮像領域からの光17Dの光路とを反射板23により効果的に分割することができ、これによって、撮像素子15aの受光面上における左右の撮像領域からの光17L、17Rと下側の撮像領域からの光17Dとの混じり合いを効果的に抑制でき、画質の向上が図れる。

【0024】なお、本実施形態では、反射板23により第2の光路変換手段を構成したが、プリズム13の下面13aまたは上面13bに一体的に設けられた反射膜により第2の光路変換手段を構成してもよい。この場合、反射膜は、プリズム13の下面13aまたは上面13bに設けられた金属膜等によって形成される。

【0025】<第2実施形態>図2は、本発明の第2実施形態に係る車載撮像装置の要部の構成を示す縦断面図である。本実施形態に係る車載撮像装置21が前述の第1実施形態に係る車載撮像装置21と実質的に異なる点は、反射板23がプリズム13とは別個にケース11内に設置されてる点のみであり、対応する部分には同一の参照符号を付し、重複する説明を省略する。

【0026】本実施形態においても、撮像光学系の上下方向に対する撮像視野角Cを拡大させることなく、左右の撮像領域と、その左右の撮像領域から正面方向Aに対して下方向に大きく外れた下側の撮像領域とを単一の撮像素子15aにより同時に撮像できるとともに、撮像素子15aの受光面上における左右の撮像領域

からの光17L、17Rと下側の撮像領域からの光17Dとの混じり合いを反射板23によって効果的に抑制できる。

【0027】<第3実施形態>図3は、本発明の第3実施形態に係る車載撮像装置の要部の構成を示す縦断面図である。本実施形態に係る車載撮像装置21が前述の第1実施形態に係る車載撮像装置21と実質的に異なる点は、第2の光路変換手段として反射板23の代わりにプリズム25を用いた点のみであり、対応する部分には同一の参照符号を付し、重複する説明を省略する。

【0028】本実施形態では、撮像視野角Cbに対応してプリズム13の下方側にプリズム25が設けられ、正面方向Aに対して下側の撮像領域から入射する光17Dが、プリズム25によって屈折されることによりその光路を変換させて結像レンズ15bに導入され、撮像素子15aに入射されるようになっている。

【0029】ここでは、プリズム25は、三角形の縦断面形状を有しており、略上方に向けて山形に交わる2つのプリズム側面25a、25bにより、下側の撮像領域から入射する光17Dを屈折させて結像レンズ15b側にその光路を変換させるようになっている。また、プリズム25の正面方向Aに対する傾斜角度および両プリズム側面25a、25bのなす角度は、所望とする下側の撮像領域からの光17Dを結像レンズ15bおよび撮像素子15aに導くのに必要な値にそれぞれ設定される。

【0030】以上のように、本実施形態においても、撮像光学系の上下方向に対する撮像視野角Cを拡大させることなく、左右の撮像領域と、その左右の撮像領域から正面方向Aに対して下方向に大きく外れた下側の撮像領域とを単一の撮像素子15aにより同時に撮像することができる。

【0031】<第4実施形態>図4は、本発明の第4実施形態に係る車載撮像装置の要部の構成を示す縦断面図である。本実施形態に係る車載撮像装置21が前述の第1実施形態に係る車載撮像装置21と実質的に異なる点は、第2の光路変換手段として反射板23の代わりにプリズム27を用いた点と、上方の撮像視野角Caにより下側の撮像領域を撮像し、下方の撮像視野角Cbにより左右の撮像領域を撮像する点のみであり、対応する部分には同一の参照符号を付し、重複する説明を省略する。

【0032】なお、本実施形態では、下方の撮像視野角Cbにより左右の撮像領域を撮像するため、撮像ユニット15の撮像光軸Bは、撮像視野角Cbの中心軸が水平方向とほぼ平行となるように、水平方向に対して上方に角度Daをなすように設定されている。

【0033】本実施形態では、撮像視野角Caに対応してプリズム13の上方側にプリズム27が設けられ、正面方向Aに対して下側の撮像領域から入射する光17Dが、プリズム27によって屈折されることによりその光路を変換させて結像レンズ15bに導入され、撮像素子

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15aに入射されるようになっている。

【0034】ここでは、プリズム27は、三角形の縦断面形状を有しおり、略上方に向けて山形に交わる2つのプリズム側面27a、27bにより、下側の撮像領域から入射する光17Dを屈折させて結像レンズ15b側にその光路を変換させるようになっている。また、プリズム27の正面方向Aに対する傾斜角度および両プリズム側面27a、27bのなす角度は、所望とする下側の撮像領域からの光17Dを結像レンズ15bおよび撮像素子15aに導くのに必要な値にそれぞれ設定される。

【0035】以上のように、本実施形態においても、撮像光学系の上下方向に対する撮像視野角Cを拡大させることなく、左右の撮像領域と、その左右の撮像領域から正面方向Aに対して下方向に大きく外れた下側の撮像領域とを単一の撮像素子15aにより同時に撮像することができる。

【0036】

【発明の効果】請求項1に記載の発明によれば、第1および第2の撮像領域からの光の光路を変換させて結像レンズに導入する第1の光路変換手段の他に、第3の撮像領域から入射する光を反射または屈折させることによりその光路を変換させて結像レンズに導入する第2の光路変換手段が設けられているため、撮像素子および結像レンズからなる撮像光学系の上下方向に対する撮像視野角を拡大させることなく、第1および第2の撮像領域と、その第1および第2の撮像領域からこの車載撮像装置の正面方向に対して下または上方向に大きく外れた第3の撮像領域とを単一の撮像素子により同時に撮像することができる。

【0037】請求項2に記載の発明によれば、第2の光路変換手段である反射板が第1の光路変換手段であるプリズムの下面または上面に一体的に設けられているため、プリズムと第2の光路変換手段とを1部品として取り扱うことができ、部品点数および組立工数等の削減が図れる。

【0038】また、結像レンズの入射面側において、プリズムによって反射されて結像レンズに入射する第1および第2の撮像領域からの各光の光路と、反射板によって反射されて結像レンズに入射する第3の撮像領域からの光の光路とを反射板により効果的に分割することができ、これによって、撮像素子の受光面上における左右の撮像領域からの光と下または上側の撮像領域からの光との混じり合いを効果的に抑制でき、画質の向上が図れる。

【0039】請求項3に記載の発明によれば、第2の光

路変換手段である反射膜が第1の光路変換手段であるプリズムの下面または上面に一体的に設けられているため、プリズムと第2の光路変換手段とを1部品として取り扱うことができ、部品点数および組立工数等の削減が図れる。

【0040】また、第2の光路変換手段である反射膜が第1の光路変換手段であるプリズムの下面または上面に一体的に設けられているため、結像レンズの入射面側において、プリズムによって反射されて結像レンズに入射する第1および第2の撮像領域からの各光の光路と、反射膜によって反射されて結像レンズに入射する第3の撮像領域からの光の光路とを反射膜により効果的に分割することができ、これによって、撮像素子の受光面上における左右の撮像領域からの光と下または上側の撮像領域からの光との混じり合いを効果的に抑制でき、画質の向上が図れる。

【図面の簡単な説明】

【図1】本発明の第1実施形態に係る車載撮像装置の構成を示す縦断面図である。

【図2】本発明の第2実施形態に係る車載撮像装置の要部の構成を示す縦断面図である。

【図3】本発明の第3実施形態に係る車載撮像装置の要部の構成を示す縦断面図である。

【図4】本発明の第4実施形態に係る車載撮像装置の要部の構成を示す縦断面図である。

【図5】図1の車載撮像装置の好適な使用形態の一例を示す図である。

【図6】図1の車載撮像装置の好適な使用形態の一例を示す図である。

【図7】従来の車載撮像装置等の構成を示す横断面図である。

【図8】図7の車載撮像装置の構成を示す縦断面図である。

【符号の説明】

7 表示装置

11 ケース

13 プリズム

13L, 13R プリズム側面

15a 撮像素子

15b 結像レンズ

17L, 17R, 17D 光

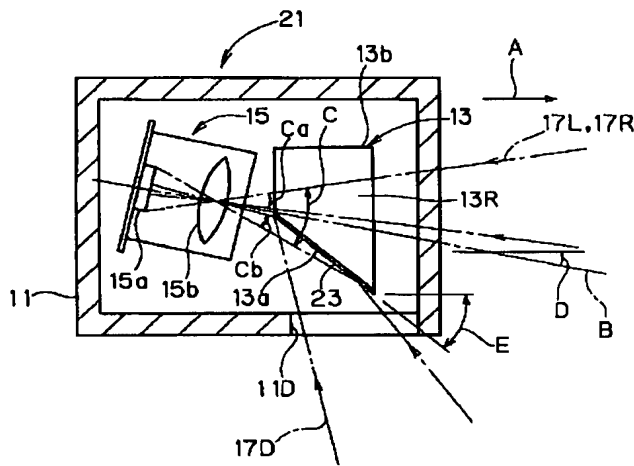
21 車載撮像装置

23 反射板

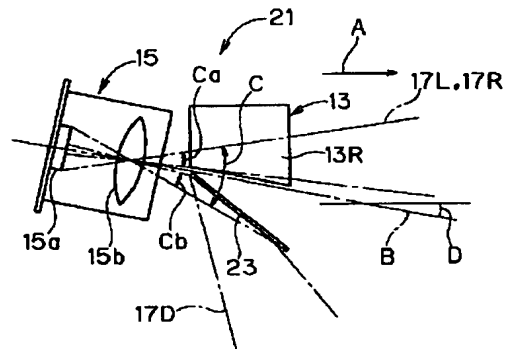
25, 27 プリズム

A 正面方向

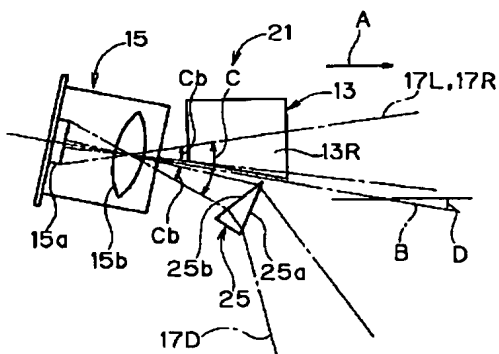
【図1】



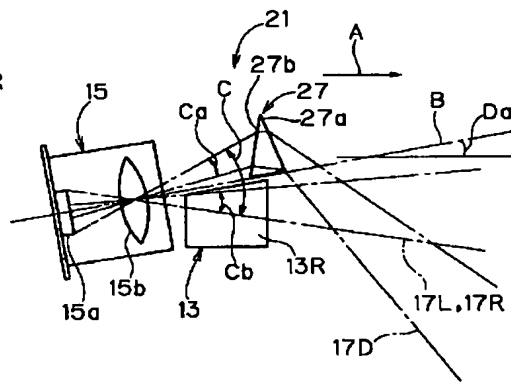
【図2】



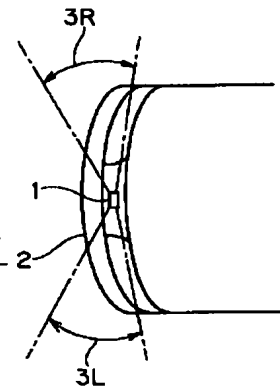
【図3】



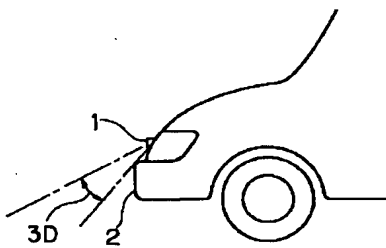
【図4】



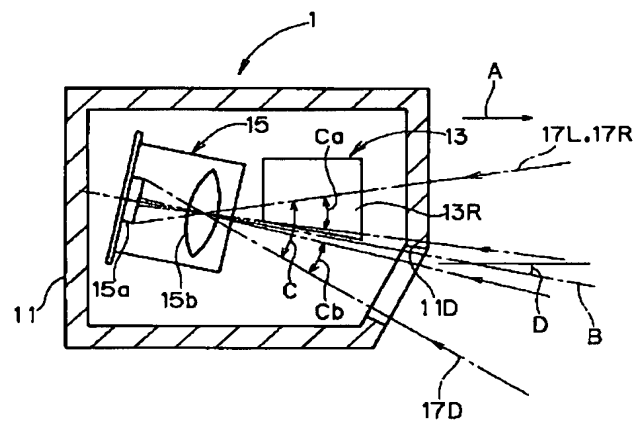
【図5】



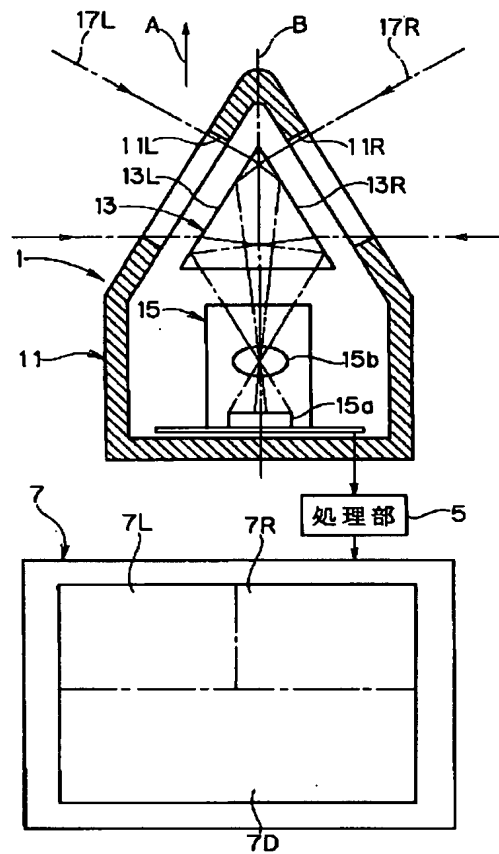
【図6】



【図8】



【図7】



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(72)発明者 岡田 潤
愛知県名古屋市南区菊住1丁目7番10号
株式会社ハーネス総合技術研究所内

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EA01 HA30